

UTILITY PATENT APPLICATION TRANSMITTAL (Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.
98045 P US

Total Pages in this Submission

TO THE ASSISTANT COMMISSIONER FOR PATENTSBox Patent Application
Washington, D.C. 20231

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

Knife Holder and a Knife for a Microtome

and invented by:

Drago BOROSICIf a **CONTINUATION APPLICATION**, check appropriate box and supply the requisite information:☐ Continuation ☐ Divisional ☒ Continuation-in-part (CIP) of prior application No.: **PCT/EP97/06437**

Which is a:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.:

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☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.:

Enclosed are:

Application Elements

1. ☒ Filing fee as calculated and transmitted as described below
2. ☒ Specification having 10 pages and including the following:
 - a. ☒ Descriptive Title of the Invention
 - b. ☒ Cross References to Related Applications (if applicable)
 - c. ☒ Statement Regarding Federally-sponsored Research/Development (if applicable)
 - d. ☒ Reference to Microfiche Appendix (if applicable)
 - e. ☒ Background of the Invention
 - f. ☒ Brief Summary of the Invention
 - g. ☒ Brief Description of the Drawings (if drawings filed)
 - h. ☒ Detailed Description
 - i. ☒ Claim(s) as Classified Below
 - j. ☒ Abstract of the Disclosure

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Application Elements (Continued)

3. ☒ Drawing(s) (when necessary as prescribed by 35 USC 113)
- a. ☒ Formal Number of Sheets 1
- b. ☐ Informal Number of Sheets _____
4. ☒ Oath or Declaration
- a. ☐ Newly executed (original or copy) ☒ Unexecuted
- b. ☐ Copy from a prior application (37 CFR 1.63(d)) (for continuation/divisional application only)
- c. ☒ With Power of Attorney ☐ Without Power of Attorney
- d. ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s) named in the prior application,
see 37 C.F.R. 1.63(d)(2) and 1.33(b).
5. ☐ Incorporation By Reference (usable if Box 4b is checked)
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied
under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby
incorporated by reference therein.
6. ☐ Computer Program in Microfiche (Appendix)
7. ☐ Nucleotide and/or Amino Acid Sequence Submission (if applicable, all must be included)
- a. ☐ Paper Copy
- b. ☐ Computer Readable Copy (identical to computer copy)
- c. ☐ Statement Verifying Identical Paper and Computer Readable Copy

Accompanying Application Parts

8. ☐ Assignment Papers (cover sheet & document(s))
9. ☐ 37 CFR 3.73(B) Statement (when there is an assignee)
10. ☒ English Translation Document (if applicable)
11. ☒ Information Disclosure Statement/PTO-1449 ☒ Copies of IDS Citations
12. ☐ Preliminary Amendment
13. ☒ Acknowledgment postcard
14. ☒ Certificate of Mailing
- ☐ First Class ☒ Express Mail (Specify Label No.): EK482397202US

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Accompanying Application Parts (Continued)

15. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed)

16. ☒ Additional Enclosures (please identify below):

GERMAN SPECIFICATION
GENERAL AUTHORIZATION TO CHARGE FEES

Fee Calculation and Transmittal

CLAIMS AS FILED

For	#Filed	#Allowed	#Extra	Rate	Fee
Total Claims	14	- 20 =	0	x \$18.00	\$0.00
Indep. Claims	2	- 3 =	0	x \$78.00	\$0.00
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>					\$0.00
BASIC FEE					\$690.00
OTHER FEE (specify purpose)					\$0.00
TOTAL FILING FEE					\$690.00

- ☒ A check in the amount of \$690.00 to cover the filing fee is enclosed.
- ☒ The Commissioner is hereby authorized to charge and credit Deposit Account No. 11-0665 as described below. A duplicate copy of this sheet is enclosed.
- ☐ Charge the amount of _____ as filing fee.
- ☒ Credit any overpayment.
- ☒ Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.
- ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).



Signature

Dated: April 3, 2000

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Knife Holder and Knife for a Microtome

Cross-References to Related Applications

Not Applicable.

Statement Regarding Federally Sponsored Research or Development

5 Not Applicable.

Reference to a Microfiche Appendix

Not Applicable.

Background of the Invention

10 The invention relates to a knife holder for a microtome, with a knife receiver for arresting and positioning a knife, and also a knife for this knife holder.

Microtomes find application in histology and are used for the production of tissue sections, which are then investigated under the microscope. For the production of the tissue sections, the microtome passes the object to be sectioned past a stationary knife, which must be very sharp and which is therefore held by a knife holder as an interchangeable blade.

15 Discussion of Relevant Art

A knife holder of the above-mentioned kind is known from the brochure "2040 AUTOCUT" of the Reichert-Jung Company; a knife constructed as an elongate blade is clamped in it. In order not to have to constantly change the knife, it is constructed with a length such that it can be displaced with respect to the object holder, and several regions of the blade can be successively brought into use in this manner. This of course has the consequence that the knife holder has a large width, which is not ergonomic. In particular, the removal of the sections with the finger is hindered by the great width of the knife holder, and the person operating the equipment has no way of monitoring which regions of the knife have already

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been used and which are still sharp. The danger of accidents is also increased by the length of the knife. A finger protector can counter this, but this makes it awkward to work with the equipment. Also, when different regions of the blade are successively used, the blade is then used up relatively quickly and must be changed.

5 Summary of the Invention

The invention has as its object to construct a knife holder and a knife of the above-mentioned kind, such that the knife holder can be constituted to be ergonomic, work is simpler and safer, and also the knife does not have to be changed so often.

10 In terms of the knife holder, this object is attained in that the knife receiver is constituted for the reception of a disk-shaped knife which has the shape of a regular polygon, the edges of which are cutting edges, wherein the knife receiver has a shaft by which the knife is rotatable so that the cutting edges can be positioned to cut an object.

In terms of the knife, the object is attained in that it is constituted in a disk form in the form of a regular polygon, wherein the edges are cutting edges.

15 Due to the shape of the knife as a polygon, the knife holder can be constituted to be relatively narrow and hence also ergonomic. Such a polygon has as many cutting edges as it has edges; for example, in a preferred octagonal form, eight cutting edges are available.

Although the individual cutting edges are shorter than the knives mentioned at the beginning, which reduces the danger of accidents and makes a covering with a finger protector
20 superfluous, the total length of cutting edges of the knife according to the invention is considerably larger than that of the knives mentioned at the beginning. Due to the rotation of the knife, better account can be kept of which portions are already used and which are still sharp. In order to facilitate this, a preferred embodiment provides a numbering associated with

the cutting edges of a knife. Since the knife according to the invention is clamped in its surface -- and thus not laterally -- nearly a hundred percent of its cutting edges can be made use of.

In a particularly suitable embodiment, the knife holder has a depression, and an opening serves for the working use of one of the cutting edges, and this cutting edge projects beyond this opening far enough that a cut can be made with it. The depression serves to receive the knife and for the protection of the cutting edges which are not in use, thus considerably reducing the danger of accidents.

The knife receiver of the knife holder can be arranged in various ways. A depression of circular contour milled into it is provided in which the knife can turn with little play, and a clamping device serves to arrest the knife for a cut to be performed. The knife receiver will suitably be equipped, however, with a rotatable mounting for the knife.

In an advantageous embodiment, the rotatable mounting has a positioning element for the knife, by which the cutting edges of a knife are mounted in a defined position. Such a positioning element can be arranged as a pin situated outside the middle and engaging in a bore of the knife, as a projection affixed to the shaft on which the knife is placed, or in other ways.

Work is greatly facilitated by the knife holder having a detent for the rotatable mounting, latching when a cutting edge is situated in its cutting position. The knife is thus in the correct cutting position after each further rotation, and no adjustment is necessary. The detent can be constituted in an optional manner.

The rotatable mounting can be arranged in a manner such that the knife is clamped between two surfaces of the same, or it is possible for the knife receiver to have a plane surface arranged such that the knife can be positioned between this and the rotatable mounting. The plane surface and the shaft can then be situated on the knife holder housing, or it is possible for

the shaft to be a portion of the mounting which is inserted into a bore of the plane surface and anchored there. In the first case, the knife is first placed on the shaft, and the rotatable mounting is fastened to the shaft. In the second case, the knife is placed on the shaft of the rotatable mounting, and the shaft is then inserted into the knife holder housing, so that the shaft
5 and/or the mounting is held rotatably or else arrestably. In both cases, or also for other embodiments, it is possible for a releasable stop for the rotation of the knife to be provided, to fix the knife in the cutting positions.

The nearly round shape of the knife makes it possible to constitute the knife holder housing in a particularly ergonomic manner. The space required for a cutting edge is thus
10 relatively small, and it is possible for the knife holder housing to be beveled or rounded, left and right of the mounting for the cutting edge which is ready for use.

The knife is also constituted corresponding to the constitution of the knife holder. It can be a simple polygon that can be placed in a milled-out recess that is shaped in a round shape or in the same polygonal shape as the knife. It can have a square or hexagonal hole in
15 the middle for a corresponding shaft, or a bore for placing on a round shaft. In the latter case, it is suitable for the knife to have a contact for a positioning element of the knife receiver, correspondingly, as described above, as a bore, a notch for the engagement of a lug, or in another manner.

Brief Description of the Drawings

20 The invention will be explained hereinbelow with reference to a possible embodiment example, and further possibilities of configuration will be mentioned.

Fig. 1 shows an embodiment of the invention in front view,

Fig. 2 shows a rotatable mounting, and

Fig. 3 shows a partial view in the section III-III.

Detailed Description of Preferred Embodiments

Fig. 1 shows a knife holder 1 with a knife receiver 2, in which a knife 3 having the form of an octagon is mounted. The knife 3 has eight cutting edges 4, one of which is situated in the location 15 for working use. The knife 3 is held by a rotatable mounting 8 in which it is inserted, between this and a plane surface 11 of the knife holder housing 14. A positioning element 9 (Fig. 3) insures that the knife 3 assumes a defined position to the rotatable mounting 8. By the rotation of the mounting 8, each optional cutting edge 4 of the knife 3 can be brought to the location 15. For working use, the knife 3 is clamped by means of a stop 13. In order for the cutting edges 4 which are not in working use to be protected, the knife 3 is situated in a depression 6 of the knife holder housing 14, the floor of which forms the plane surface 11. Only the cutting edge 4 designated for working use is situated at an opening 7 of the depression 6 at the upper edge of the knife holder housing 14, so that this cutting edge 4 projects outward and is ready for a cut.

For changing the knife 3, the stop 13 is released, the closure 18 is opened, and the rotatable mounting 8 is taken out together with the knife 3. For easy working, it is appropriate to make the mounting 8 of magnetic material so that the knife 3 adheres to it. The closure 18 can be made with a threaded closure, bayonet closure, or other quickly releasable connection. A guide 19 serves for the attachment of the knife holder 1 to the microtome, and the stop 20 for fixing in the desired position. The knife holder housing 14 can be ergonomically arranged with chamfers 16 or by rounding off.

Fig. 2 shows a rotatable mounting 8 which is arranged with a numbering whereby it can be better determined which cutting edge 4 of a knife 3 has already been used and which is still

sharp.

Fig. 3 shows a partial view in the form of a section III-III of Fig. 1. The arrangement of the knife 3 in the knife holder housing 14 is shown. The knife 3 is placed with the mounting 8 on a shaft 5 and is held by means of a closure 18. A positioning element 9, constituted as a
5 lug on the shaft 5 and as notches on the mounting 8 and knife 3 serves to determine the position of the cutting edges 4 with respect to the shaft 5 and thus with respect to a detent 10.

The detent 10, constituted as a spring-loaded ball or in another manner, engages in latching positions such that the cutting edges 4 always arrive in the correct working position upon rotation of the mounting 8 with the knife 3. For the use of a cutting edge 4, the knife 3 and the
10 mounting 8 is determined by means of the stop 13. For this purpose, in this embodiment, a shaft 13' with an eccentric 13'' is proposed, wherein the latter engages in a groove 13''' of the shaft 5. By the actuation of the lever of the stop 13, the mounting 8 with the knife 3 can be fixed, or can be released for turning further on or for changing the knife 3.

In the knife holder according to the invention, the rotation axis of the rotatable
15 mounting 8, i.e., the rotation axis of the shaft 13', is perpendicular to the plane surface 11 of the knife holder and hence perpendicular to the plane of the cutting edges 4 of the knife 3 to be received in the knife holder. In addition to this rotation axis for the knife 3, the knife holder can have a further clampable rotation axis for setting the free angle between the plane of the knife 3 to be received and the specimen to be cut; such a rotation axis is then situated parallel
20 to the plane surface 11 of the knife holder housing 14; preferably, such a rotation axis coincides with the cutting edge 4, more precisely, with the cutting edge, located in the working position, of the knife. The technical realization of such a rotation axis for free angle location is known from the state of the art, for example, in that the knife holder housing 14 is divided

between the receiver for the knife 3 and the guide 19 along a partial portion of a cylindrical envelope whose cylinder axis coincides with the cutter edge of the cutting edge of the knife to be received; it therefore needs no further description here.

Furthermore, the knife does not need to be constituted in one piece for the knife holder
5 according to the invention. It is also conceivable that the knife is a combination of several parts, e.g., the knife consists of a polygonal blade holder, in which a corresponding number of blades is received along the peripheral edges.

The embodiment shown is solely as an example. As already stated hereinabove,
numerous other embodiments are conceivable, in particular for the location and the changing
10 of the knife 3, and also for the construction of the stop and the embodiment of the detent.

I Claim:

Claim 1: A microtome for the production of tissue sections in histology, in which an object to be sectioned is passed past a stationary knife for production of said tissue section, comprising:

a disk-shaped knife (3), which has the shape of a regular polygon, with edges that comprise cutting edges (4), and

a knife holder (1) with a knife receiver (2) for arresting and positioning said disk-shaped knife (3),

wherein said knife receiver (2) is constructed for reception of said knife (3), and,

wherein said knife receiver (2) has a shaft (5) by which said knife (3) is rotatable such that said cutting edges (4) are positionable for cutting an object.

Claim 2: The microtome according to Claim 1, wherein said knife holder (1) has a depression (6) for reception of said knife (3) and for protection of said cutting edges (4), with an opening (7) that serves for working use of one of said cutting edges (4).

Claim 3: The microtome according to Claim 1, wherein said knife receiver (2) comprises a rotatable mounting (8) for said knife (3).

Claim 4: The microtome according to Claim 3, wherein said rotatable mounting (8) has a positioning element (9) for said knife (3), by which positioning element (9) said cutting edges (4) of said knife (3) come into a defined position relative to said mounting (8).

Claim 5: The microtome according to Claim 4, wherein said knife holder (1) has a detent (10) for said rotatable mounting (8) that latches when one of said cutting edges (4) is situated in a cutting position.

Claim 6: The microtome according to Claim 3, wherein said knife receiver (2) has a plane surface (11) arranged such that said knife (3) is positionable between said plane surface and

said rotatable mounting (8).

Claim 7: The microtome according to Claim 1, further comprising a numbering arrangement (12) assigned to said cutting edges (4) of said knife (3).

Claim 8: The microtome according to Claim 1, further comprising a releasable stop (13) for rotation of said knife (3) for location of said knife (3) in cutting positions.

Claim 9: The microtome according to Claim 1, wherein said knife holder comprises a knife holder housing (14) that is chamfered left and right of a location (15) for said cutting edge (4) when said cutting edge is in a position for use.

Claim 10: The microtome according to Claim 1, wherein said knife holder comprises a knife holder housing (14) that is rounded off left and right of a location (15) for said cutting edge (4) when said cutting edge is in a position for use.

Claim 11: A microtome for production of tissue sections in histology, in which an object to be sectioned is passed past a stationary knife for production of said tissue sections, wherein said knife is disk-shaped in the shape of a regular polygon, and said knife has edges that are cutting edges (4).

Claim 12: The microtome according to Claim 11, wherein said knife has a bore (17) in its middle for reception of a knife holder (1) in a knife receiver (2).

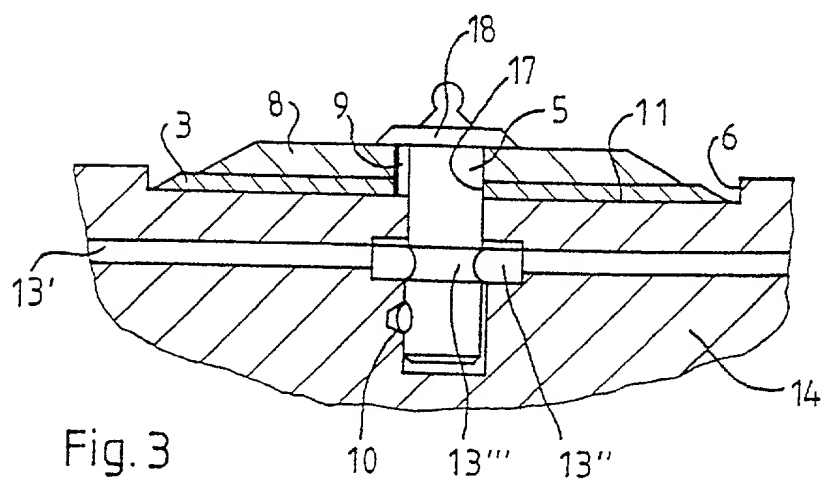
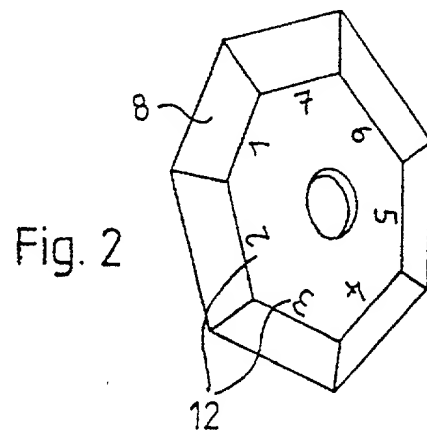
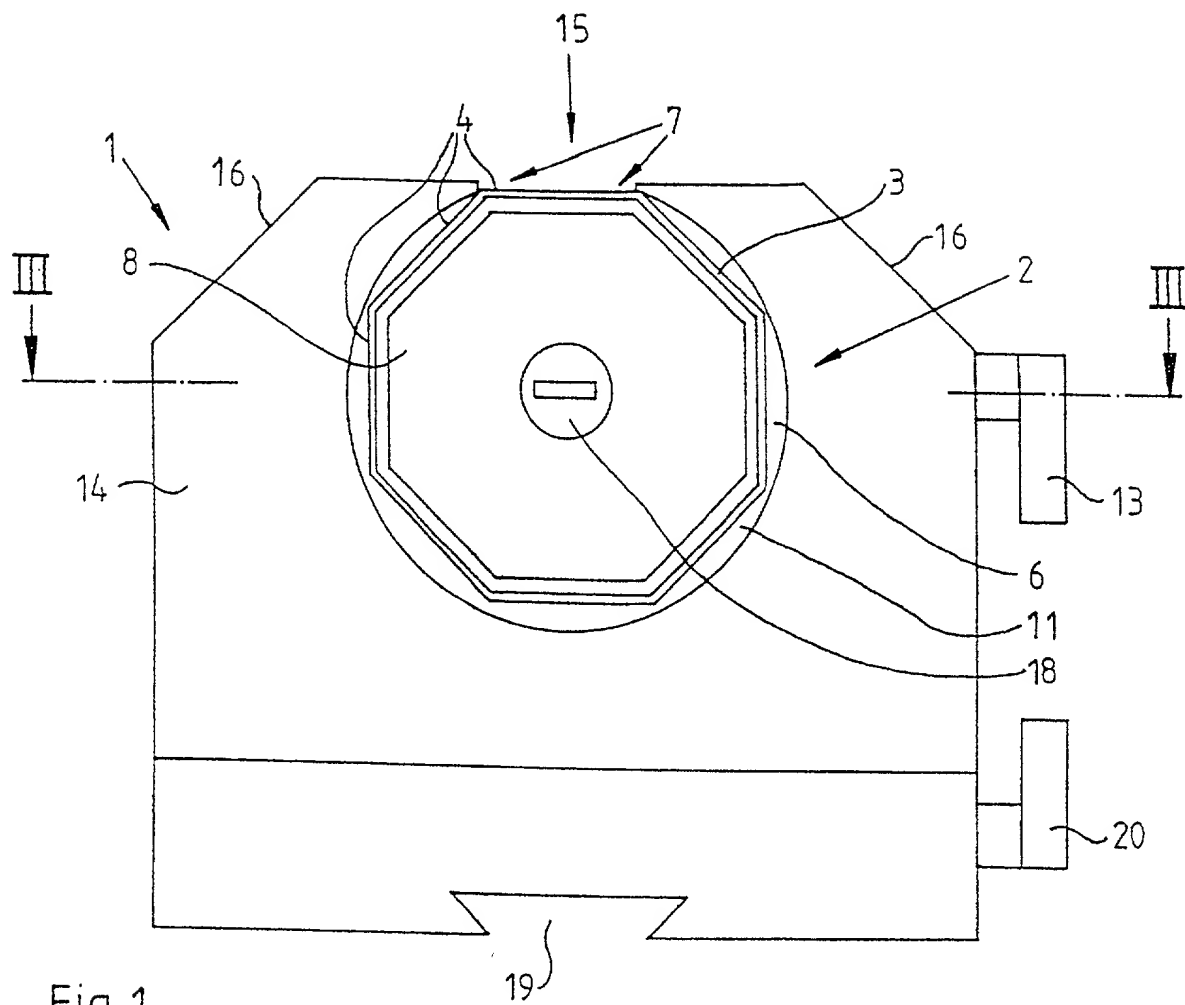
Claim 13: The microtome according to Claim 11, wherein said knife has an engagement for a positioning element (9) of a knife receiver (2).

Claim 14: The microtome according to Claim 11, wherein said knife comprises an octagon shape.

Abstract of the Invention

The invention relates to a knife holder for a microtome having a knife receiver for fixing and positioning a knife and a knife for the knife holder. The knife holder is ergonomic, the operation is made easier and safer, and the knife does not need to be changed as often. To
5 this end, the knife receiver is constructed to accommodate a disk-shaped knife. The knife is given the shape of a regular polygon, whereby the edges are cutters. The knife receiver has an axle on which the knife can rotate such that the cutters can be positioned for cutting an object.

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Docket No.

98045 P US

Declaration and Power of Attorney For Patent Application

English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Knife Holder and a Knife for a Microtome

the specification of which

(check one)

☒ is attached hereto.

☐ was filed on _____ as United States Application No. or PCT International Application Number _____ and was amended on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority Not Claimed
197 44 983.2	Germany	13 October 1997	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	
_____	_____	_____	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	
_____	_____	_____	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

(Application Serial No.)

(Filing Date)

(Application Serial No.)

(Filing Date)

(Application Serial No.)

(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

PCT/EP98/06437

12/10/1998

Pending

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

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